

Empower. Partner. Lead.



Ohio Supercomputer Center

Introducing Computational Science in the Curriculum – Part 2

Steven I. Gordon
Senior Director of Education and Client Services
Ohio Supercomputer Center
sgordon@osc.edu



Explain the role of modeling in science and engineering

- Major concepts
 - What is a model?
 - Types of models
 - Advantages of using models to solve science and engineering problems
 - Benefits of modeling in practical engineering applications
- Exercise – review of examples of modeling use in science and engineering

What is a Model

- Abstraction of reality used to understand a complex system
 - A formally described simplification of a system
 - Any formulation used by people to make decisions even if not in a formal way
- Some everyday examples
 - Maps
 - Computer games
 - Toys
 - Weather forecasts
 - Where should I go for lunch if I only have 30 minutes

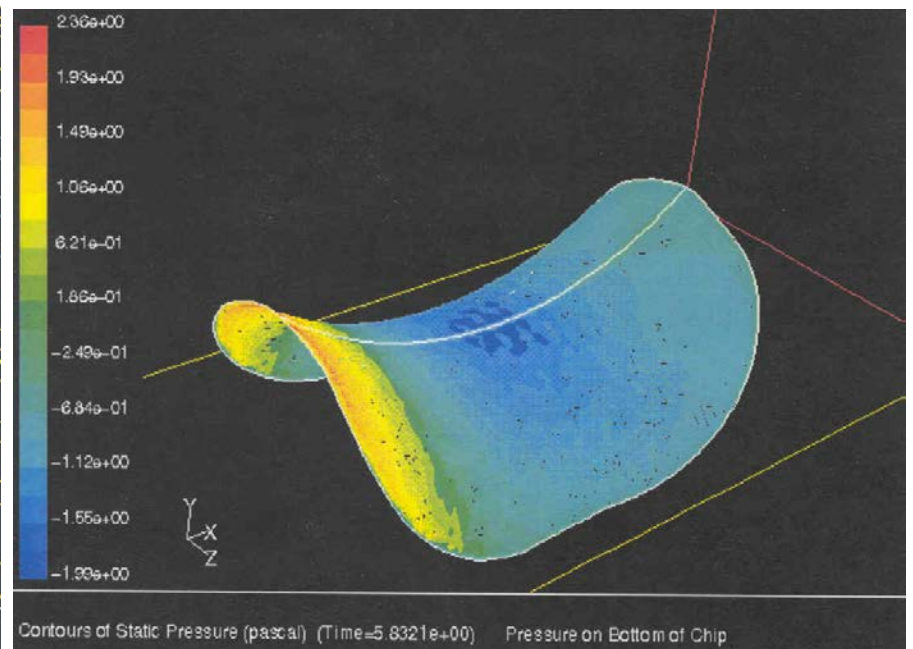
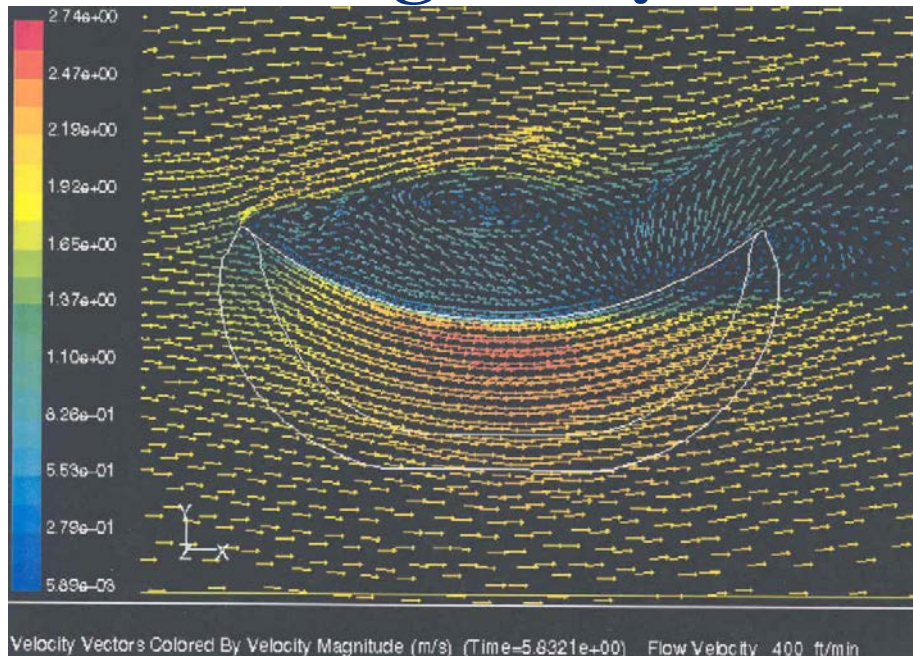
Types of Models

- Physical replicas or physical models
- Mathematical models
 - Many different types of mathematical models
 - Computer models are solutions of mathematical models done with a computer
- Further discussion of types of models as we continue our discussion of models

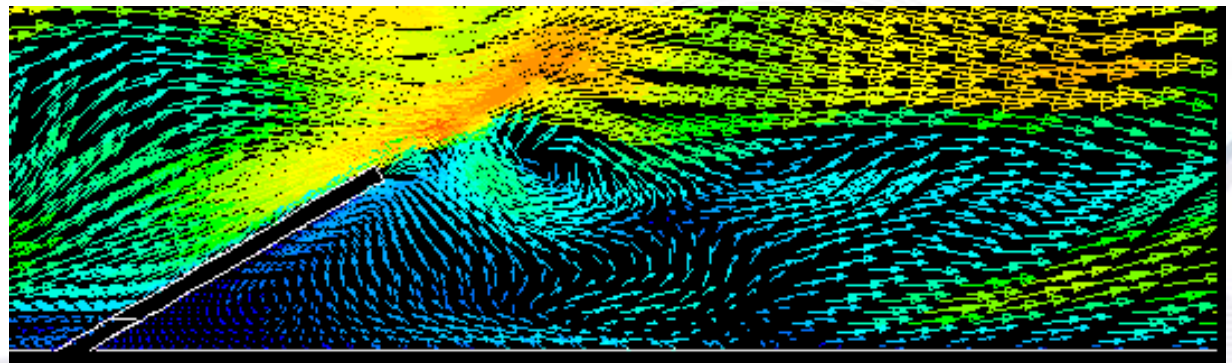
Why Scientists and Engineers Use Computer Models

- Can examine systems that are too complex to understand, too small to see, too large or sensitive to manipulate experimentally
 - A third way of gaining insights along with theory and experimentation
- Advantages for business
 - Can create virtual prototypes at much lower expense
 - Can examine more alternatives and more innovative alternatives
 - Saves time – gets things to market faster
 - Extends communications about design throughout the organization
 - Creates a competitive advantage

Will Pringles Fly?



High Speed Conveying
Create Vortices
Shedding...
...'Rocking Chips'
NOT GOOD!



Exercise

- Open [simulationuseassignment.pdf](#)
- Work on the exercise and be prepared to discuss the examples
- Can you think of other examples?
- What are the benefits of starting modeling students with such examples?

Course Outline

- Open Introduction to Modeling and Simulation Course Outline (html)